

# Executive summary

## 1 Introduction

Fermilab's vision is to "lead, inspire and enable the world's scientists to solve the mysteries of matter, energy, space and time for the benefit of current and future generations."

Fermilab's mission is to advance particle physics in partnership with universities and laboratories worldwide by: 1) driving discovery through theory and experiment, 2) building and operating world-leading scientific facilities; and 3) developing innovative technologies for science and industry.

Integral to Fermilab's far-reaching mission, in its singular role as America's Particle Physics laboratory, is the building and operation of world-leading scientific facilities. The purpose of the Fermilab Campus Master Plan (hereafter referred to as the campus plan) is to provide a set of guidelines to ensure the Fermilab campus evolves in a way that supports the laboratory's vision and mission over the next 20 years while adhering to a set of guiding principles.

The campus plan design team worked closely with the Master Planning Task Force (MPTF) in the development of the plan. The MPTF includes representatives from Fermilab (Directorate and Division and Section heads), The Department of Energy, the University of Chicago and the Illinois Institute of Technology.

### 1.1 Vision Statement

The Fermilab campus of the future will be a state-of-the-art particle physics laboratory hosting a vibrant, international community of employees and users on a safe, accessible site that celebrates and protects the natural environment.

### 1.2 Guiding Principles

The campus master plan and subsequent planning processes at Fermilab are guided by six interrelated and mutually supportive principles. These principles were formed in response to the issues and opportunities that have emerged in the planning process and embody the main objectives of the plan.

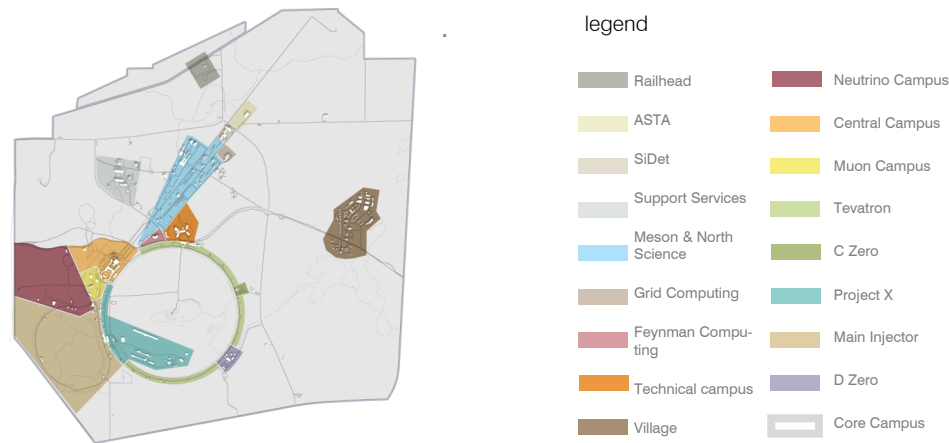
- I. Preserve the unique character of Fermilab.
- II. Ensure new facilities support cutting-edge research.
- III. Encourage a sense of community.
- IV. Ensure environmental stewardship and sustainable design.
- V. Ensure the campus is safe and accessible to pedestrians and cyclists.
- VI. Ensure the campus is welcoming to visitors.

1.4 Purpose

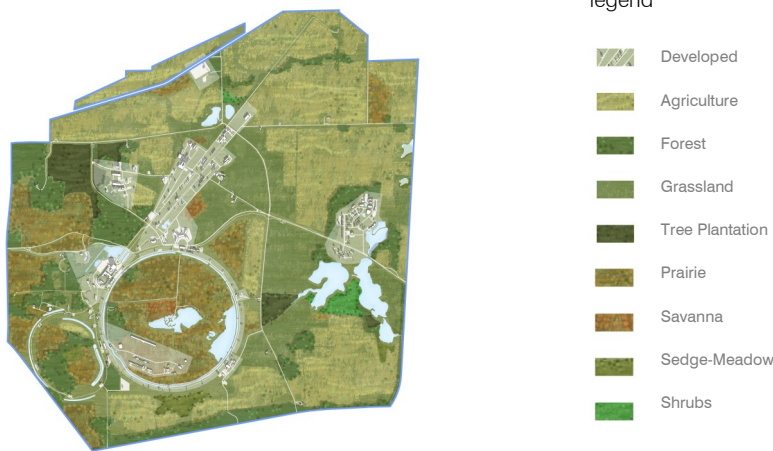
Fermilab’s first director, Robert Wilson, described the laboratory as “a utopian place where physicists from all parts of the country, and from all countries, would be doing their creative thing in an ambiance of well-functioning and yet beautiful instruments, structures and surroundings that would reflect the magnificence of their discoveries and theories.”

The Fermilab Campus Site Plan aims to keep that spirit alive while guiding future developments to the laboratory site over the next 20 years. Just as we look to our long-term scientific goals in planning our scientific program for the laboratory, so should we look to our long-term site development goals in planning updates to the Fermilab campus.

1.5 Campus regions



1.6 Campus lands



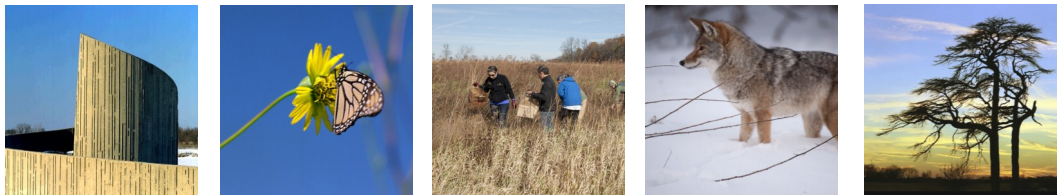
## 2 Context

Fermilab, the only U.S. national laboratory devoted to particle physics, was founded in 1968. Fermilab's 1,700 employees and 4,600 scientific users advance humankind's understanding of matter, energy, space and time by carrying out a world-leading program of discovery. The laboratory's core skills include experimental and theoretical particle physics, astrophysics and accelerator science; R&D for accelerator and detector technologies; the construction and operation of large-scale facilities; and high-performance scientific computing.

### 2.1 Campus

The Fermilab campus occupies 6,800 acres of primarily farmland 42 miles west of Chicago in Batavia, Illinois. The land was purchased by the State of Illinois and provided to the Atomic Energy Commission (a precursor to the Department of Energy). The site includes about 362 buildings and 70 trailers taking up a total of about 2.4 million gross square feet of space. The laboratory includes 122 acres of parking lots and hundreds of miles of utility infrastructure including roads, electrical, natural gas, industrial cooling water, potable water and sanitary systems. The total replacement value of the property is \$1.8 billion. This includes the laboratory's programmatic accelerator and tunnel assets.

Fermilab's founding director, Robert Wilson, greatly influenced the design of the laboratory site. Both a physicist and an artist, Wilson believed that a research laboratory should be a cultural center for the community and the nation.



### 2.2 What people value most about Fermilab

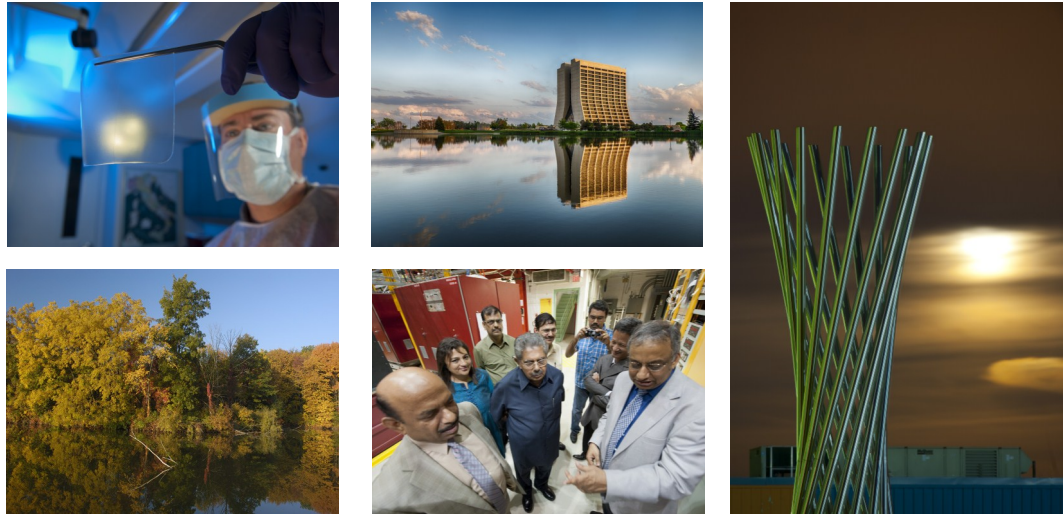
Fermilab is noted for and valued for Science first and foremost. Bold and innovative ideas and technologies from particle physics have entered the mainstream of society to transform the way we live.

Nature inspires via the beauty and diversity of its natural setting and surroundings.

Art and Architecture: Fermilab's respect for art and architecture is rooted in the founder's philosophy. In the words of Fermilab founding Director Robert Wilson,

Community: The people of Fermilab form an international community of scientists, engineers and support staff.

Worldwide reach: Partnership with universities and laboratories worldwide,



### 2.3 Current perspectives on the campus

The master planning design team considered how the Fermilab campus is perceived, along with how it is currently used and how it will be used in the future, and agreed on 13 points:

1. Fermilab employees and visitors appreciate the spirit in which the campus was originally designed and would like to preserve it.
2. Some of that spirit seems to have been lost in the utilitarian design of recently added buildings and utilities.
3. On the other hand, some designs from the early days of the laboratory prioritized aesthetics to the detriment of functionality. The best design should consider both.
4. Fermilab scientists have planned the scientific program of the laboratory for the next 20 years.
5. Many of Fermilab's aging and inadequate manufacturing, assembly, engineering and technical facilities will need to be updated to accommodate the laboratory's scientific program.
6. Fermilab requires additional high-quality industrial space, high-bay space and other technical spaces to accommodate the laboratory's scientific program.
7. The laboratory should use space more efficiently. Current allocations are not in line with comparable industry standards, GSA guidelines and National Laboratory trends.
8. Employees, especially recent graduates, expect to have the option of working in a more relaxed setting at times.
9. Concentrating the work spaces of a larger number of people in one area of campus

will facilitate collaboration—within and across divisions—and will improve the work lives of employees.

10. Providing additional communal spaces, both indoors and outdoors, will facilitate both intentional and unplanned collaboration.
11. The visitor experience needs improvement.
12. Fermilab needs a meaningful and effective system of pedestrian connections, bikeways and shuttles.
13. Projects should be planned keeping in mind a long-range, holistic vision of the campus—including its safety, performance, accessibility, sustainability, environment, character and costs.

## 2.4 Key Challenges

Responding to the current perspectives, the campus plan design team has identified three key challenges facing the Fermilab.

1. Creating a modern, state-of-the-art research laboratory: Facilities that enable Fermilab to design build and test the scientific tools it needs to carry out its leading-edge research and development.
2. Creating a sense of community: A place where researchers and staff work nearby, easily meeting together to exchange ideas.
3. Creating a sense of place: A campus noted for its natural, architectural and experiential qualities.

### 3 Vision

The campus plan is based on a long-term vision of what the Fermilab campus can become—how it might look, feel and function 20 years from now. The campus plan envisions a laboratory that can be described in six words: open, green, consolidated, integrated, engaged and connected.

Achieving this vision for Fermilab will require careful design and thoughtful and integrated planning. While much of that planning is presented in this 2013 Fermilab Campus Master Plan, more work and study will be needed in the future to further shape and refine the plan. In that spirit, the campus plan is considered a living document, part of an ongoing, iterative process.

The planning process will take into consideration the functional relationships, environmental issues, landscaping, recreational space, vehicular and pedestrian traffic patterns, architectural character and future aspirations of the laboratory.

#### 3.1 What could Fermilab look like in 20 years?

##### 1. Concentrated and Integrated

Currently diffuse facilities will be condensed into the Central Campus. Creativity and innovation will flourish as researchers and staff mingle in this distinct and vibrant place of research and collaboration.

##### 2. Open and Green

Consolidation of buildings will help preserve Fermilab's rich and diverse natural areas and make available other areas for future large-scale physics machines.

##### 3. Connected and Engaged

The campus will be connected by various modes of transportation: walking, biking and, possibly, a campus shuttle.

#### 3.2 A vision of stewardship and sustainability

Fermilab is committed to increasing sustainability. The campus plan takes into consideration environmental issues and incorporates them into the planning process. The campus plan includes a vision of regional stewardship, effective management of open land, surface water management, sustainable design, effective space utilization and transpiration initiatives.

## 4 The campus plan

### 4.1 Essential features of the plan

The essential features are responses to the vision, guiding principles, perspectives and key challenges.

**Preserve the unique character of Fermilab:** The character of the campus is defined in part by its integration with the landscape, which will be a primary concern in future developments. The Central Campus will be designed to encourage walking and taking in the natural environment. State-of-the-art architectural design will create sustainable, aesthetic, inviting, accessible buildings that create a “sense of place” and convey Fermilab’s status as a center of research excellence. The quality of open spaces and streetscapes will be improved through effective and aesthetic signage, lighting, paving and site elements. Landscaping will screen unsightly utility and service infrastructure. Parking in the Central Campus will be moved to the perimeter and screened to minimize its visual impact.

**Ensure new facilities support cutting-edge research:** New facilities will support Fermilab’s 20-year scientific plan.

**Encourage a sense of community:** The campus plan includes a consolidated Central Campus with outdoor space where interaction can occur to promote collaboration and the exchange of ideas.

**Ensure environmental stewardship and sustainable design:** The campus plan acknowledges that Fermilab’s natural areas are some of its primary assets and helpful in attracting scientists, staff and visitors to the laboratory. According to the campus plan, obsolete facilities will be removed, and sites will be either redeveloped or restored to nature.

**Ensure the campus is safe and accessible to pedestrians and cyclists:** Pedestrian walkways, bicycle paths, a bicycle-sharing program and a possible shuttle service will provide multiple safe transportation options on the site.

**Ensure the campus is welcoming to visitors:** A new visitor entrance at the Central Campus will guide visitors on their arrival at Fermilab. Displays will promote the unique qualities of the site and explain what it has to offer to the curious in terms of science, nature and wildlife.

### 4.2 Obsolete facilities removal

The campus plan implementation will see the removal of obsolete, inadequate, scattered and antiquated facilities, many dating back to the founding era and before. The proposes the removal 56 buildings and 44 portacamps, totaling 433,000 SF. These facilities are located in the village, Sidet, Technical Campus and the Wilson Hall central campus region.



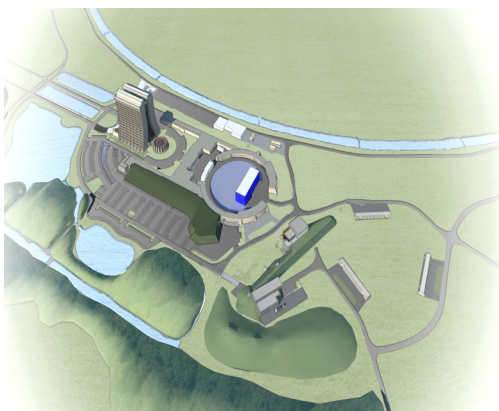
### 4.3 Planned future projects and campus developments

Planned future projects are located within five of the 17 campus regions. The five regions and their respective projects are listed below. The pages that follow present each campus and its planned projects through narrative and illustrations.

**The Central Campus** will include the construction of the Integrated Engineering Research Centers, the Collision Hall, the Quad, Wilson Hall 2.0 and a Guest House. A reimagined site configuration will blend the new project with the existing buildings on the site, resulting in a unified Central Campus.



**The Technical Campus** will consist of the construction of the Industrial Facilities Consolidation Project, an administrative center and a new high bay. A reimagined site configuration will blend the new project with the existing buildings on the site, resulting in a unified Technical Campus.



**The Muon Campus** will include new Intensity Frontier experimental facilities: two new surface buildings and a berm over the reconfigured Antiproton Source, residing with the existing antiproton buildings. Included in the project plan are the necessary roadway and site reconfigurations and multi-modal access ways from the Central Campus.



**The Neutrino Campus** is a newly defined campus region. It will include the existing neutrino experiments in the region and the new proposed Long Baseline Neutrino Experiment (LBNE). LBNE would require the construction of six or seven surface buildings and a large berm. The scope of the campus development would include additional roadways and access from the Central Campus and site configurations to accommodate the new facilities.

**The Project X Campus** is a newly identified campus region that will house the proposed Project X. This campus will be located inside of the Tevatron ring. It will consist of upwards of 12 buildings, depending on the final design, scope and phasing. The project will also include roadway and site access construction, along with multi-modal access ways to the Central Campus

#### 4.4 Transportation

How Fermilab's campus functions and the experience it provides depends in large part on how people move about and how well-connected the lab's various parts are to one another. Given its location, size and land-use diversity, Fermilab must accommodate multiple modes of travel. This campus plan addresses aspects of the laboratory's movement systems, focusing on strategies that will make the campus more pedestrian and mass-transit friendly.












#### 4.5 Campus landscape

Landscape initiatives beautify the campus, help establish the identity of different areas and balance development with green space and outdoor amenities. This campus plan describes the purposes and locations of the Central Campus landscape initiatives. These initiatives will help shape and define the character of the Fermilab campus for the coming generations.

## 5 Implementation and outcome

The campus plan provides a holistic and integrated framework for future development of the major regions of the Fermilab Campus. The plan also proposes, at a conceptual design level, major projects that will meet the foreseeable development needs of the laboratory over the next 20 years. .

Following is a summary of the projects and initiatives proposed by the campus plan. The planned future projects are presented in three phases that describe one possible implementation strategy over the 20-year planning horizon, although others could be imagined.

Project	Est. Area	Phase 1	Phase 2	Phase 3
<b>Central Campus</b>				
IER East and West	110,000 SF			
IER south and central	110,000 SF			
Collision Hall	25,000 SF			
Wilson Hall 2.0	NA			
Guest House	NA			
<b>Technical Campus</b>				
IFC	36,000 SF			
High Bay	30,000 SF			
Administrative Center	24,000 SF			
<b>Muon Campus</b>	NA			
<b>Neutrino Campus</b>	NA			
<b>Project X</b>	NA			

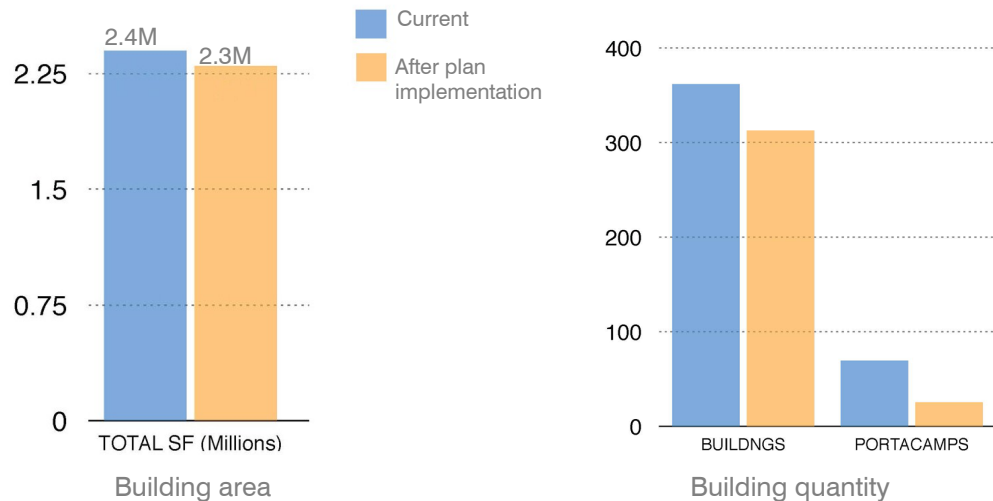
## 5.1 Plan Outcome

As the campus plan implementation proceeds, Fermilab will preserve its role as a 21st century laboratory for 21st century science.

Eliminating and replacing obsolete facilities will allow the modernization needed to support Fermilab's scientific program over the next 20 years. Consolidating new facilities in the Central Campus will result in an improved sense of community and an improved experience for visitors, along with greater efficiency and sustainability. Reducing the overall development footprint will result in a more pedestrian- and cyclist-friendly campus with less reliance on vehicular transportation.

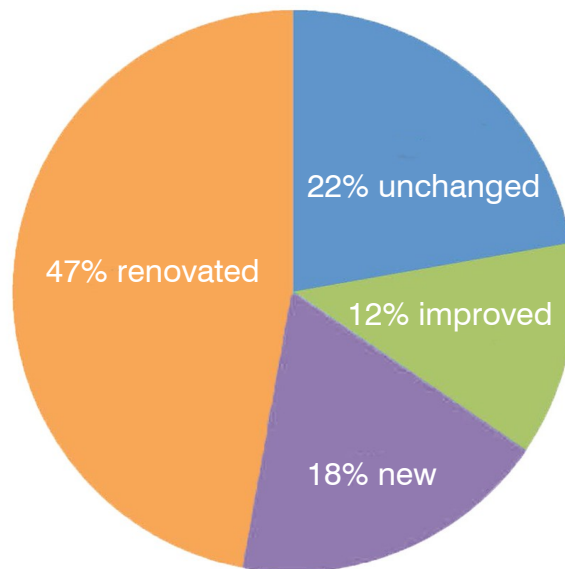
A significant portion of the currently deferred maintenance costs are devoted to facilities identified for replacement as part of the modernization program. Therefore deferred maintenance costs will fall significantly when replacement facilities are completed and obsolete facilities are demolished.

These benefits will ensure Fermilab is equipped to attract and retain researchers and to fulfill its vision and mission over the next generation of scientific research.



### Affect on the workplace

The following chart illustrated the numbers of staff workspaces impacted by campus plan future projects. The outcome will be large percentages of staff working in places of improved quality, effectiveness and efficiency. The segment indicated as unchanged reports that these spaces are adequate and appropriate for the foreseeable future.



## 5.2 The next steps and further study

As the inaugural edition of the Fermilab Campus Master Plan, this document has focused on big picture site wide issues and developed and incorporated planned future projects. However, the campus plan has been identified as a 'living document', to be updated on an annual basis. In that spirit, this section offers thoughts on possible agendas and planning exercises as the future unfolds.